

CURRICULUM VITAE

Rasmus Tang Christiansen

PhD Student, Institut Laue-Langevin and University of Manchester

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RESEARCH INTERESTS

Molecular spin dynamics, valence delocalisation, quantum materials, advanced spectroscopies (in particular inelastic neutron scattering and electron paramagnetic resonance).

EDUCATION

University of Manchester as *Institut Laue-Langevin Graduate Fellow*

Ph.D., Inorganic Chemistry

February 2021 - Present

Title: Double Exchange Spin Dynamics within Valence Delocalised Molecular Magnets

Supervisors: Dr. M. L. Baker, Dr. J. Ollivier, and Dr. Hab. R. Clérac

Abstract: In mixed-valence molecules, delocalisation of spin-polarised valence electrons, so-called double exchange, can contribute to the spin dynamics alongside Heisenberg exchange. This can lead to desirable properties such as switchable molecules or molecules with well-isolated high-spin ground states. However, fundamental understanding of double exchange is lacking, which hinders its application. Our goal is to use the most powerful probe of molecular spin dynamics, neutron spectroscopy, to gain unprecedented insight into the nature of double exchange and to develop the first computational tools for modelling neutron spectroscopy measurements thereof.

My PhD research is being undertaken within a research group which studies actinides, lanthanides and transition metals using X-ray and neutron spectroscopy as well as advanced computational methods. As such, I have a broad knowledge of electronic structure across the periodic table.

University of Copenhagen

M.Sc., Physics

January 2021

Title: Magnetic Properties of $\text{Al}(\text{OH})_3$ -Based Layered Double Hydroxides

Supervisors: Prof. K. Lefmann and Prof. U. G. Nielsen

B.Sc., Physics

January 2018

SCIENTIFIC CONTRIBUTIONS

Papers

- A. B. A. Andersen, **R. T. Christiansen**, S. Holm-Janass, A. S. Manvell, K. S. Pedersen, D. Sheptyakov, J. P. Embs, H. Jacobsen, E. Dachs, J. Vaara, K. Lefmann, and U. G. Nielsen: The Magnetic Properties of $\text{MAl}_4(\text{OH})_{12}\text{SO}_4 \cdot 3\text{H}_2\text{O}$ with $\text{M} = \text{Co}^{2+}$, Ni^{2+} , and Cu^{2+} Determined by a Combined Experimental and Computational Approach, *Phys. Chem. Chem. Phys.*, 2023, **25**, 3309-3322

Oral Contributions

- **R. T. Christiansen**, S.-Q. Wu, A.-L. Barra, O. Sato, R. Clérac, J. Ollivier, and M. L. Baker: Chemical Tailoring of Double Exchange in Mixed Valence Diiron Molecules, *contributed talk*, European Conference on Neutron Scattering, March 2023
- **R. T. Christiansen**, A. B. A. Andersen, K. S. Pedersen, E. Dachs, J. Bendix, K. Lefmann, and U. G. Nielsen: Magnetic Properties of $\text{MAl}_4(\text{OH})_{12}\text{SO}_4 \cdot 3\text{H}_2\text{O}$ with $\text{M} = \text{Co}^{2+}$, Ni^{2+} , and Cu^{2+} , *contributed talk*, UK Neutron Scattering Group Early Career Meeting, August 2020

SKILLS

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|-----------------------------|---|
| Languages | Danish (native), English, French |
| Software & Tools | Python, MatLab, EasySpin, SpinW, Mantid, Horace |
| Exp. Methods | Neutron Spectroscopy (Powders and Single Crystals, Applied E/B-fields) Electron Paramagnetic Resonance ($\nu = 9 - 662$ GHz, $B = 0 - 16$ T) Magnetometry (SQUID and Vibrating Sample Magnetometer) Far-Infrared Magneto-Spectroscopy |

BEAMTIMES

Accepted peer-reviewed proposals (24 days in total)

- Magnetic Order in Molecule-Based Room Temperature Magnets, D1B@ILL, 3 days, autumn 2023
- Double Exchange Spin Dynamics Unravalled by 4D INS, PANTHER@ILL, 6 days, autumn 2023
- Competition between Heisenberg Exchange, Double Exchange and Vibronic Coupling in a Mixed-Valence Dimer with an Intermediate Spin Ground State, MARI@ISIS, 2 days, July 2023
- Probing a Quantum Clock Transition in Mn-doped Li_3N by 4D INS, IN5@ILL, 6 days, June 2023
- Double Exchange in Valence Delocalised Fe Dimers, SEQUOIA@SNS, 5 days, December 2022
- Magnetic Excitations in High- T_c Metal-Organic Magnets, PANTHER@ILL, 2 days, September 2021

Participations (as of June 5th, 2023)

- Zero-Field Splitting in Valence Delocalised Fe Dimers, INS, IN5@ILL
- Double Exchange in Valence Delocalised Fe Dimers, INS, SEQUOIA@SNS
- Relaxation Dynamics of Isolated Lanthanide Single-Molecule Magnets, XMCD/XAS, DEIMOS@Soleil
- Magnetic Excitations in High- T_c Metal-Organic Magnets, INS, PANTHER@ILL
- Electric Field Dependence of Spin Excitations in an Fe_{14} Molecule, INS, LET@ISIS
- Element-Selective Vibrational Spectroscopy of Fe-doped Li_3N Single Crystals, NRVS, ID18@ESRF

EXPERIENCE

High School Teacher August 2019 - June 2020
at Allerød Gymnasium

- Taught theoretical and practical physics classes at the high school level
- Adapted to virtual teaching during the Covid-19 pandemic

Science Communicator November 2016 - August 2019
at Experimentarium

- Communicated a wide range of sciences, such as physics, biology, and geology, to children and adults
- Routinely performed science shows for audiences of more than 100 people
- Facilitated science workshops for visiting schools

EXTRA-CIRRICULAR

ILL PhD Student Representative, July 2022 - June 2023

Co-supervision of MChem students, November 2021 - May 2022 and January - June 2023

Mentor at the ILL/ESRF Summer School, September 2021, 2022 and 2023

Military service February - May 2018

Semester at Danish folk high school "Silkeborg Højskole", January - May 2014